of the present disclosure are used to distinguish between similar objects, but not necessarily used to describe a specific order or sequence. It should be understood that data used in this way can be interchanged as appropriate so that the embodiments of the present disclosure described here can be implemented in an order other than those shown or described here. In addition, the terms "comprise" and "have" and any variants thereof are intended to cover non-exclusive inclusion. For example, a process, method, system, product or equipment comprising a series of steps or modules or units is not necessarily limited to those steps or modules or units which are clearly listed, but may comprise other steps or modules or units which are not clearly listed or are intrinsic to such processes, methods, products or equipment.

[0162] References in the specification to "one embodiment," "an embodiment," "an exemplary embodiment," etc., indicate that the embodiment described may include a particular feature, structure, or characteristic, but every embodiment may not necessarily include the particular feature, structure, or characteristic. Moreover, such phrases are not necessarily referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with an embodiment, it is submitted that it is within the knowledge of one skilled in the art to affect such feature, structure, or characteristic in connection with other embodiments whether or not explicitly described.

[0163] The exemplary embodiments described herein are provided for illustrative purposes, and are not limiting. Other exemplary embodiments are possible, and modifications may be made to the exemplary embodiments. Therefore, the specification is not meant to limit the disclosure. Rather, the scope of the disclosure is defined only in accordance with the following claims and their equivalents.

[0164] Embodiments may be implemented in hardware (e.g., circuits), firmware, software, or any combination thereof. Embodiments may also be implemented as instructions stored on a machine-readable medium, which may be read and executed by one or more processors. A machine-readable medium may include any mechanism for storing or transmitting information in a form readable by a machine (e.g., a computer). For example, a machine-readable medium may include read only memory (ROM); random access memory (RAM); magnetic disk storage media; optical storage media; flash memory devices; electrical, optical, acoustical or other forms of propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.), and others. Further, firmware, software, routines, instructions may be described herein as performing certain actions. However, it should be appreciated that such descriptions are merely for convenience and that such actions in fact results from computing devices, processors, controllers, or other devices executing the firmware, software, routines, instructions, etc. Further, any of the implementation variations may be carried out by a general-purpose computer.

[0165] For the purposes of this discussion, the term "processor circuitry" shall be understood to be circuit(s), processor(s), logic, or a combination thereof. A circuit includes an analog circuit, a digital circuit, state machine logic, data processing circuit, other structural electronic hardware, or a combination thereof. A processor includes a microprocessor, a digital signal processor (DSP), central processor (CPU), application-specific instruction set processor (ASIP), graphics and/or image processor, multi-core processor, or other hardware processor. The processor may be "hard-coded" with instructions to perform corresponding function(s) according to aspects described herein. Alternatively, the processor may access an internal and/or external memory to retrieve instructions stored in the memory, which when executed by the processor, perform the corresponding function(s) associated with the processor, and/or one or more functions and/or operations related to the operation of a component having the processor included therein.

[0166] In one or more of the exemplary embodiments described herein, the memory is any well-known volatile and/or non-volatile memory, including, for example, read-only memory (ROM), random access memory (RAM), flash memory, a magnetic storage media, an optical disc, erasable programmable read only memory (EPROM), and programmable read only memory (PROM). The memory can be non-removable, removable, or a combination of both.

1. A computer-implemented method for training an artificial intelligence entity (AIE) for detecting abnormalities in medical imaging data of a human organ, the method comprising:

providing medical imaging data of the human organ as training data including training samples, the medical imaging data including a plurality of imaging results from different types of imaging techniques for each training sample of the training data;

providing at least one pre-trained or randomly initialized artificial intelligence entity (AIE); and

training the at least one AIE using the provided training samples, the training including:

in a first sub-step, for at least one training sample, calculating a first loss function for at least a sub-structure of the at least one AIE independently of at least one first spatial region of the human organ, and

in a second sub-step, for at least one training sample, calculating a second loss function for at least a sub-structure of the at least one AIE independently of at least one second spatial region of the human organ;

wherein the at least one AIE is trained using at least the calculated first loss function and the calculated second loss function.

2. The method of claim **1**, wherein the first spatial region and the second spatial region are disjunct.

3. The method of claim **2**, wherein:

the first loss function is based only on pixels or voxels of the provided medical imaging data within the second spatial region; and

the second loss function is based only on pixels or voxels of the provided medical imaging data within the first spatial region.

4. The method of claim **1**, wherein in the first sub-step and in the second sub-step subsequently, the corresponding loss function for the same at least sub-structure of the AIE is calculated.

5. The method of claim **1**, wherein:

for the first sub-step, the imaging results from the at least one first type of imaging technique within each training sample of the at least one training sample are replaced by a pre-defined blank before being used for calculating the first loss function, and

for the second sub-step, the imaging results from the at least one second type of imaging technique within each training sample of the same at least one training sample are replaced by the pre-defined blank before being used for calculating the second loss function.